

# Meetings

## History of Biochemistry and Molecular Biology

Recognizing that the development of modern biochemistry and molecular biology represents one of the sure intellectual achievements of our time, with far-reaching implications for the sciences and for human affairs, an increasing number of scientists, historians and others have begun to trace origins and the course of these developments. To consider and promote these endeavors, the Committee on the History of Biochemistry and Molecular Biology of the American Academy of Arts and Sciences brought together about 30 participants in a small conference at the House of the Academy in Brookline, Massachusetts, from 21 to 25 May 1970. Among those taking part were scientists who had been active contributors in these areas of investigation, historians and sociologists of science, and librarians concerned with gathering and preservation of source material for the future historian. The participants recognized the important opportunities for the historian in this field today. Many of the leading workers who are responsible for the great advances of the last half-century are still with us and can provide much insight into the nature of the events as they were actually seen by the investigators themselves. The opportunity, however, may be lost if we do not take steps to preserve the unpublished papers and correspondence of the major and some of the minor actors in the drama, and obtain their personal recollections of the events in which they were involved. The lively discussion at the conference helped to promote some of the necessary interchange of ideas between scientists, historians, and archivists, and to suggest further steps that should be taken.

In the opening session Carl F. Cori outlined the history of lactic acid in biology since its discovery by Scheele in the 18th century, including the long and tangled history of lactic acid in relation to muscular activity, and the controversy of a century ago over the

relative roles of carbohydrate, fat, and protein in muscular work. S. E. Luria described the early history of the bacteriophage work which Max Delbrück and he initiated; the role of the Cold Spring Harbor Laboratory of a generation ago, with the enthusiastic encouragement of Demerec as director of the laboratory; and the close interplay of thinking and experiment among a small group including Delbrück, Luria, A. D. Hershey, and T. F. Anderson with his electron microscope. When they were not together in person, they were constantly in touch by letter and telephone. Who did the experiment to settle some new idea was unimportant; it was only important that the thing should be done. Among many other points, Luria discussed Avery's work demonstrating that DNA was the transforming factor in pneumococcus—work of which he was well aware even before its publication—and considered why its revolutionary implications did not have a more immediate impact on the phage geneticists.

Taking up at this point, Gunther Stent considered the idea that some discoveries are premature and are, therefore, not appreciated in their time. The work of Mendel is the prime example in biology, but to some extent the concept may apply to Avery's work also. Some have dismissed the whole idea of "prematurity" as essentially a tautology; but Stent, although holding that tautologies are often in fact highly significant, maintained that a discovery is actually premature when it cannot be connected by a series of simple logical steps to contemporary canonical ideas. It cannot be appreciated until a series of other advances has provided a new framework into which the discovery can fit. He also discussed, and rejected, the general view that scientific and artistic creation are fundamentally different—the view that a creation in art or literature is unique and irreplaceable, whereas a scientific discovery, if not made by one man, will

be a commonplace. He held the view of uniqueness in art, and a good deal more in science, than the common view maintains. These views led to a long and very lively discussion. Robert K. Merton remarked that Stent's views on uniqueness represented the first really novel contribution to the subject that he had heard in 35 years and discussed them in relation to his own studies of repeated duplication of scientific discoveries by different people.

J. T. Edsall, F. J. W. Roughton, A. B. Hastings, and W. H. Forbes considered the growth of knowledge of the role of hemoglobin in the transport of oxygen and carbon dioxide in the blood, beginning with the observations of Christian Bohr and his collaborators in 1904, which for the first time demonstrated cooperative interactions in the binding of oxygen and what would now be called heterotropic interactions of carbon dioxide on oxygen binding. The later work of J. S. Haldane, J. Barcroft, L. J. Henderson, D. D. Van Slyke, and others led to the detailed characterization of blood as an integrated system, highly adapted to its function, primarily because of the remarkable properties of hemoglobin.

R. C. Olby examined the growth of molecular biology at the University of Cambridge and at Caltech, considering the factors and events in the earlier history of these institutions which served to foster the brilliant later developments. Saul Benison and Peter D. Olch discussed the problems of gathering, editing, and preserving oral histories; the value of such histories; and the pitfalls and limitations involved in using them. The historian who sets out to gather the personal recollections of those involved in significant scientific developments must immerse himself beforehand in the work of his subject—not only the published work, but as much of the unpublished background material as possible. The series of interviews that follow may run to 40 or 50 hours, though in many instances a much smaller period suffices. With preliminary preparation, and subsequent editing of the material in the interviews, Benison estimated that the interviewing of three or four people a year is as much as the historian can wisely undertake. He must be able to ask the right questions, be a good listener, and keep his temper.

Several participants reported on their current studies in the history of biochemistry. F. L. Holmes discussed the